

This study was undertaken to establish an adequate vision screening program for elementary school children. Many different screening procedures were tried and compared. The results are discussed and recommendations are given for a satisfactory program.

DESIGN AND EVALUATION OF A VISION SCREENING PROGRAM FOR ELEMENTARY SCHOOL CHILDREN

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WE ACCEPT that visual performance has, as a minimum, relationships to achievement, safety, and adjustment and that it will be particularly important for children in the elementary schools. The problem then is to identify those children who have problems of vision or some other ocular condition, so that they may be referred for professional evaluation and care which will restore their visual performance to an optimum level. Ideally, one might hope for a thorough professional eye examination for every child before entering school. Generally this is not feasible and vision screening must fill this need.

Each visual function is a continuous variable showing distributions of various types, but always continuous, and as a result children cannot be divided into "pass" or "fail" on a nonexistent bimodal distribution. It is easy to see why it has been difficult for qualified experts to agree on screening test cut-off points at which a child should be referred for a specialist's evaluation. In most prior studies the clinical standards were the expression, in clinical terms of the judgment of one or more optometrists or ophthalmologists. In some studies the

basis for these standards is not given. In very few has there been any attempt to evaluate the standards and in fewer still has there been any attempt to bring the two interested eye professions together on the matter.¹⁻⁵

Origin of the Orinda Study

A number of factors influenced the development of this study. Significant interest was generated when California law required each elementary school to provide "adequate" testing of each child's eyes. Widely accepted procedures and standards were needed which could be applied in an average community and school system so that "adequate" testing could be achieved in fact. The county superintendent of schools and various school district superintendents, faced with the problem of making necessary provisions, asked for recommendations from the County Health Department. The Health Department is vitally interested in community health and preventive practices for all segments of its 400,000 population. Although it has only very limited legal responsibilities (primarily communicable disease control and

environmental sanitation), it makes every effort to promote good health education and health practices and standards for the 100,000 students in 34 autonomous school districts. Even though all but the smaller schools provide their own nursing services, the department provides consultation to schools in all areas of health. This is done through an assistant health officer, dental consultants, health educators, nurses, and sanitarians in the areas of curriculum, school health practices, examinations, records, sanitary inspections, and so forth.

On reexamination of the problem of vision testing, the Health Department soon discovered the lack of satisfactory screening methods, the disagreements within and between the eye disciplines, and the impossibility of suggesting procedures that actually could be regarded as adequate. Since members of the Health Department are on the faculties of both the Stanford University Medical School and the University of California, the Department of Ophthalmology of the one, and College of Optometry of the other were approached on this problem. The Health Department was able to utilize its strategic position to bring all interested parties together, including parents, local educators, and local, as well as university-based, practitioners of both eye disciplines. The parents and officials of the Orinda School District were easily interested and performed an extensive supportive and participating role in a three-year research project offering prospects of long-range benefit to children.

Study Design

Screening was performed on each child enrolled in grades one through six in the Orinda School District in 1954. Each technic was administered in such a way, and by personnel so trained as to approximate a probable, usual admin-

istration of each method. Clinical examinations were made on children failing any one of the screening tests. They were also done on a control group of one-fifth of the children selected randomly by the school administration in each grade. The clinical examinations were done independently by an optometrist at the University of California School of Optometry and an ophthalmologist at the Stanford University School of Medicine. Determination of the need for professional attention, regardless of therapy, was made jointly by the professional committee from the combined examination reports. The latter, in turn, served as a basis for determining specific clinical standards at the end of the first year. These standards were then adopted as the criteria for referral in the succeeding two years when the same pattern of rescreening and reexamination of all the children was repeated. The entire control group was given a repeat clinical examination in 1956.

Representative procedures were chosen and included: (1) Parent questionnaire or symptom inventory, modified in 1956. (2) Teacher observation, after a five-hour training course given by ophthalmologists and optometrists. (3) Nurse observation. (4) California State Department of Education Suggested Procedures, with the teacher testing visual acuity with the Snellen illiterate E, with glasses if worn, and repeated through a +1.50 and a +2.00 lens. The cover test was abandoned after the first year. The nurse retested all failures before they were classified as referrals. Nurses did both the testing and retesting in 1956. (5) The Massachusetts Vision Kit (MVK) was administered by a trained nurse and in 1956 a second failure at the hands of a second trained nurse was required before a child was classified as needing referral. (6) Telebinocular (Teleb.) was administered as the MVK above, including all tests except 8, 9, 12,

Table 1—Clinical Criteria for Referral

	"Correct-Referral"
A. Visual acuity	20/40 or less, either eye
B. Refractive error	
1. Hyperopia	+1.50 D.S. or more
2. Myopia	—0.50 D.S. or more
3. Astigmatism	±1.00 D.C. or more
4. Anisometropia	±1.00 D. or more
C. Coordination problems	
1. At distance (20 feet)	
a. Tropia	Any tropia
b. Esophoria	5Δ or more
c. Exophoria	5Δ or more
d. Hyperphoria	2Δ or more
2. At near (16 inches)	
a. Tropia	Any tropia
b. Esophoria	6Δ or more
c. Exophoria	10Δ or more
d. Hyperphoria	2Δ or more
D. Organic problems	Any verified pathology or medical anomaly of eye and/or adnexa

13, and 14. (7) The Worth Four Dot Test was done only in 1955. (8) The Modified Clinical Technique (MCT), refined at the University of California School of Optometry, was administered in the school by an optometrist. It includes visual acuity, cover test, skiame-try, and inspection for organic problems.

Results

Clinical Criteria—As a result of agree-ment on clinical findings that determined which children deserved referral for professional eye attention, clinical cri-teria were established for four variables that were shown to be relatively inde-pendent. All four of these criteria, vis-

ual acuity, refractive error, coordination and organic problems, but no more, were necessary to fail all children who needed professional eye attention. Table 1 shows the limits established in the four areas. Table 2 gives the relationships to a nation-wide interprofessional screening questionnaire with the first three quar-tiles of responses shown. The applica-tion of these four criteria and the rela-tive size of the number that failed by each criteria for one year, 1954, is shown in Figure 1.

Effectiveness of Vision Screening Pro-cedures—Figure 2 shows the relative merits of the different procedures used in 1956, the third year of testing. The most effective procedure, by a consider-able margin, is the MCT. It employs a few tests that cover a wide range of problems and has flexibility so that standards may be varied or tests changed to satisfy any set of local and profes-sional demands. The MVK makes rela-tively few overreferrals, but misses ap-proximately half of those needing refer-rals. The Telebinocular also finds ap-proximately half, but overrefers a great many. The procedure suggested by the State Department of Education misses approximately three-fourths of the cor-rect referrals, but when the cover test is eliminated keeps the overreferral rate very low. The various forms of observa-tion and questionnaires were of little value in our hands. Table 3 shows the statistical treatment of the data and the consistency of the findings for the three age groupings studied.

Costs of Screening—Currently paid hourly wages were utilized. Teachers and school nurses who are on a monthly salary were considered to have a cost factor equal to their hourly wage for the hours spent. Their overhead costs were ignored. Volunteers' time was significant, but was considered as cost free. Table 4 shows the breakdown, by test, for each of the three years. In 1956 costs were 37 cents per pupil for MVK, 42 cents

for the Telebinocular, 45 cents for the MCT. Even with no training time involved in 1956, carrying out the state suggested procedure was the most expensive at 53 cents per pupil.

Correct referrals must be regarded as a necessary community cost. However, overreferrals represent an unnecessary community cost. In Table 5 an estimate is made of what each screening procedure would cost the families in the community as a result of overreferrals. Failure to detect significant defects, the underreferrals, are also shown on this table. Since MCT found nearly all of the cases needing referral, or twice as many as the next best test, and made essentially no overreferrals, it was concluded that the MCT was much the least

expensive to the community as well as being the most efficient test we used.

Vision Status and Previous Care—The proportion of children with vision problems increased approximately 1.6 per cent per year with age over the period of time studied. In the age grouping five, six, and seven approximately 18 per cent had problems by our criteria. This increased to 31 per cent of the children in the age grouping 13, 14, and 15. It was found that more than half of those who had received professional attention previously could still not meet the study standards at the time they were screened in school. However, the majority of such children could be brought to our standards with further care.

Changes with Time—A Longitudinal

Table 2—Clinical Criteria Compared to Interprofessional Screening Questionnaire

	Clinical Criteria	"Correct-Referrals"		
		Questionnaire by Quartile		
		Q 1	Q 2	Q 3
A. Visual acuity	20/40	20/30	20/30	20/40
B. Refractive error				
1. Hyperopia	+1.50	+1.00	+1.50	+2.00
2. Myopia	—0.50	—0.50	—0.50	—0.75
3. Astigmatism	±1.00	±0.50	±0.75	±1.00
4. Anisometropia	±1.00	±0.75	±1.00	±1.50
C. Coordination problems				
1. At distance				
a. Tropia	Any	Any	Any	Any
b. Esophoria	5Δ	3Δ	4Δ	6Δ
c. Exophoria	5Δ	3Δ	5Δ	8Δ
d. Hyperphoria	2Δ	1Δ	1Δ	2Δ
2. At near				
a. Tropia	Any	Any	Any	Any
b. Esophoria	6Δ	2Δ	4Δ	7Δ
c. Exophoria	10Δ	8Δ	10Δ	12Δ
d. Hyperphoria	2Δ	1Δ	1Δ	2Δ
D. Organic problems	Any	Any	Any	Any

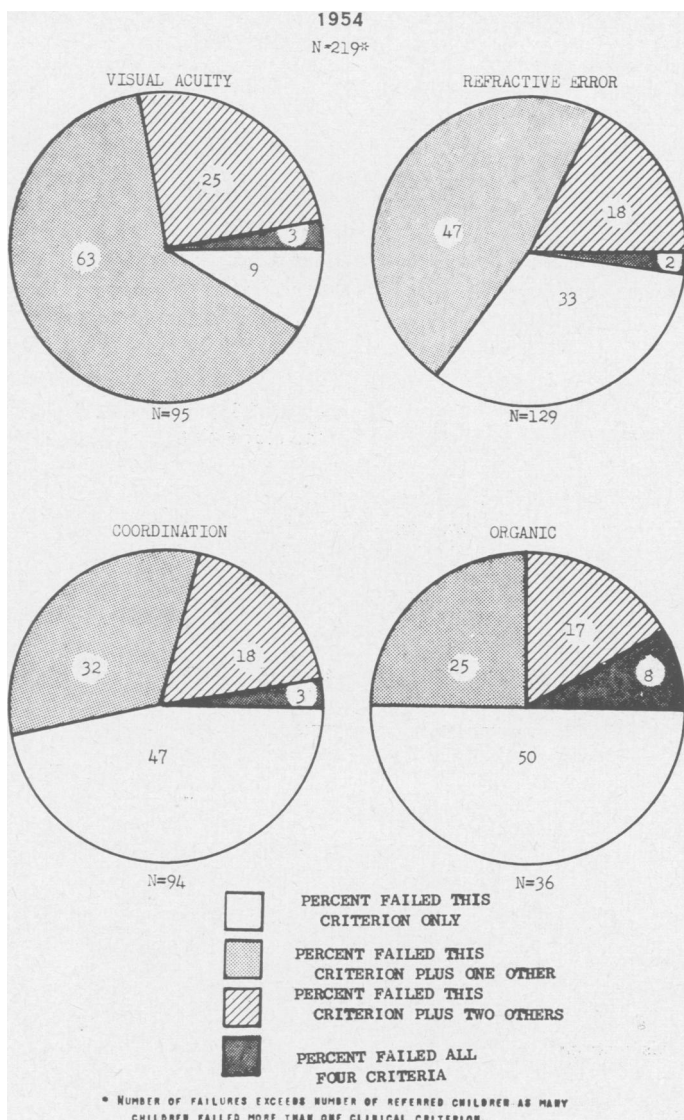


Figure 1—Clinical Criteria Failed, Correct Referrals, 1954

Study—Changes in the two-year interval, 1954-1956 (three years of testing) occurred more frequently among those with vision problems initially than among those who passed the tests. Large shifts toward more myopia, by those already myopic, and a shift of some nor-

malis to myopia were the major changes. This predominant shift was a major determinant in our recommendations for a choice of a screening device in the succeeding years of testing. Children with referable hyperopia tended to show slightly more hyperopia.

Recommendations

A successful vision screening program is greatly needed in elementary schools and can be set up in the following manner:

- 1. A steering committee with repre-

sentatives from education, ophthalmology, optometry, public health, and parent groups should develop the program. The committee, through its professional members, must obtain acceptance of the program and screening criteria by the professional persons in the community.

Figure 2—1956, Effectiveness of Screening

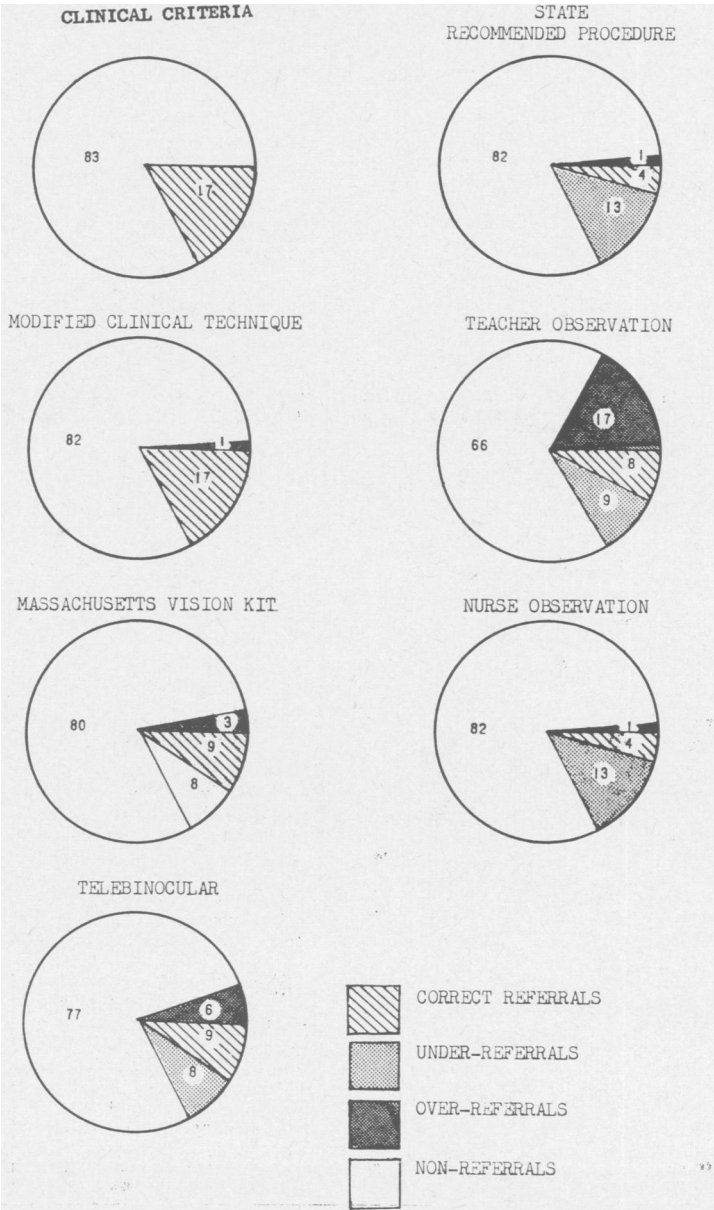


Table 3—1956 Effectiveness of Screening*

CLINICAL CRITERIA	Num- ber	% Total	% Criter.	Cor. Coef.	P						
TOTAL	1274	100				AGE GROUP 13-14-15	348	100			
REFERRED	221	17		ϕ	/100	REFERRED	69	19	ϕ	/100	
Correct-Referrals	221	17	100	(1.00)	100	Correct-Referrals	25	7	38	0.22	36
Over-Referrals	-	-			-	Over-Referrals	44	12	15		64
NOT REFERRED	1053	83		r_t		NOT REFERRED	279	81	r_t		
Under-Referrals	-	-		(1.00)	-	Under-Referrals	41	12	62	0.40	59
Non-Referrals	1053	83	100			Non-Referrals	238	69	85		
AGE GROUP 7-8-9	393	100				NURSE OBSERVATION	Num- ber	% Total	% Criter.	Cor. Coef.	P
REFERRED	72	18		ϕ	/100	TOTAL	1274	100			
Correct-Referrals	72	18	100	(1.00)	100	REFERRED	51	5	ϕ	/100	
Over-Referrals	-	-			-	Correct-Referrals	47	4	21	0.40	92
NOT REFERRED	321	82		r_t		Over-Referrals	4	1	1		8
Under-Referrals	-	-		(1.00)	-	NOT REFERRED	1223	95	r_t		
Non-Referrals	321	82	100			Under-Referrals	174	13	79	a	342
AGE GROUP 10-11-12	533	100				Non-Referrals	1049	82	99		
REFERRED	83	16		ϕ	/100	AGE GROUP 7-8-9	393	100			
Correct-Referrals	83	16	100	(1.00)	100	REFERRED	11	3	ϕ	/100	
Over-Referrals	-	-			-	Correct-Referrals	9	2	12	0.28	82
NOT REFERRED	450	84		r_t		Over-Referrals	2	1	1		18
Under-Referrals	-	-		(1.00)	-	NOT REFERRED	382	97	r_t		
Non-Referrals	450	84	100			Under-Referrals	63	16	88	a	572
AGE GROUP 13-14-15	348	100				Non-Referrals	319	81	99		
REFERRED	66	19		ϕ	/100	AGE GROUP 10-11-12	533	100			
Correct-Referrals	66	19	100	(1.00)	100	REFERRED	25	5	ϕ	/100	
Over-Referrals	-	-			-	Correct-Referrals	23	5	28	0.47	92
NOT REFERRED	282	81		r_t		Over-Referrals	2	b	b		8
Under-Referrals	-	-		(1.00)	-	NOT REFERRED	508	95	r_t		
Non-Referrals	282	81	100			Under-Referrals	60	11	72	a	240
TEACHER OBSERVATION	Num- ber	% Total	% Criter.	Cor. Coef.	P	Non-Referrals	448	84	100		
TOTAL	1274	100				AGE GROUP 13-14-15	348	100			
REFERRED	324	25		ϕ	/100	REFERRED	15	4	ϕ	/100	
Correct-Referrals	106	8	48	0.24	33	Correct-Referrals	15	4	23	0.44	100
Over-Referrals	218	17	21		67	Over-Referrals	-	-	-		-
NOT REFERRED	950	75		r_t		NOT REFERRED	333	96	r_t		
Under-Referrals	115	9	52	0.41	35	Under-Referrals	51	15	77	a	340
Non-Referrals	835	66	79			Non-Referrals	282	81	100		
AGE GROUP 7-8-9	393	100				STATE RECOMMENDED PROCEDURES	Num- ber	% Total	% Criter.	Cor. Coef.	P
REFERRED	117	30		ϕ	/100	TOTAL	1269	100			
Correct-Referrals	38	10	53	0.24	32	REFERRED	64	5	ϕ	/100	
Over-Referrals	79	20	25		68	Correct-Referrals	54	4	25	0.41	84
NOT REFERRED	276	70		r_t		Over-Referrals	10	1	1		16
Under-Referrals	34	9	47	0.32	29	NOT REFERRED	1205	95	r_t		
Non-Referrals	242	61	75			Under-Referrals	166	13	75	a	259
AGE GROUP 10-11-12	533	100				Non-Referrals	1039	82	99		
REFERRED	138	25		ϕ	/100	AGE GROUP 7-8-9	388	100			
Correct-Referrals	43	8	52	0.25	31	REFERRED	17	4	ϕ	/100	
Over-Referrals	95	17	21		69	Correct-Referrals	14	3	19	0.35	82
NOT REFERRED	395	75		r_t		Over-Referrals	3	1	1		18
Under-Referrals	40	8	48	0.42	29	NOT REFERRED	371	96	r_t		
Non-Referrals	355	67	79			Under-Referrals	58	15	81	a	341
						Non-Referrals	313	81	99		

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Table 3—1956 Effectiveness of Screening* (continued)

AGE GROUP 10-11-12	533	100					NOT REFERRED	999	85		rt		
REFERRED	33	6		φ	/100		Under-Referrals	89	8	44	0.74	49	
Correct-Referrals	26	5	32	0.45	79		Non-Referrals	910	77	93			
Over-Referrals	7	1	2		21		AGE GROUP 7-8-9	361	100				
NOT REFERRED	500	94		rt			REFERRED	55	15		φ	/100	
Under-Referrals	56	11	68	a	170		Correct-Referrals	33	9	50	0.46	60	
Non-Referrals	444	83	98				Over-Referrals	22	6	7		40	
AGE GROUP 13-14-15	348	100					NOT REFERRED	306	85		rt		
REFERRED	14	4		φ	/100		Under-Referrals	33	9	50	0.72	60	
Correct-Referrals	14	4	21	0.42	/100		Non-Referrals	273	76	93			
Over-Referrals	-	-	-		-		AGE GROUP 10-11-12	480	100				
NOT REFERRED	334	96		rt			REFERRED	67	15		φ	/100	
Under-Referrals	52	15	89	a	372		Correct-Referrals	44	10	59	0.56	66	
Non-Referrals	282	81	100				Over-Referrals	23	5	6		34	
MASSACHUSETTS							NOT REFERRED	413	85		rt		
VISION KIT	Num-ber	% Total	% Criter.	Cor. Coef.	P		Under-Referrals	30	6	41	0.82	45	
TOTAL	1178	100					Non-Referrals	383	79	94			
REFERRED	144	12		φ	/100		AGE GROUP 13-14-15	338	100				
Correct-Referrals	111	9	55	0.59	77		REFERRED	58	17		φ	/100	
Over-Referrals	33	3	3		23		Correct-Referrals	36	11	58	0.51	62	
NOT REFERRED	1034	88		rt			Over-Referrals	22	6	8		38	
Under-Referrals	91	8	45	0.83	63		NOT REFERRED	280	83		rt		
Non-Referrals	943	80	97				Under-Referrals	26	8	42	0.77	45	
AGE GROUP 7-8-9	360	100					Non-Referrals	254	75	92			
REFERRED	47	13		φ	/100		MODIFIED CLINICAL TECHNIQUE	Num-ber	% Total	% Criter.	Cor. Coef.	P	
Correct-Referrals	36	10	54	0.58	77		TOTAL	1251	100				
Over-Referrals	11	3	4		23		REFERRED	229	18		φ	/100	
NOT REFERRED	313	87		rt			Correct-Referrals	215	17	98	0.95	94	
Under-Referrals	30	8	46	0.85	64		Over-Referrals	14	1	1		6	
Non-Referrals	283	79	96				NOT REFERRED	1022	82		rt		
AGE GROUP 10-11-12	479	100					Under-Referrals	4	b	2	1.00	2	
REFERRED	53	11		φ	/100		Non-Referrals	1018	82	99			
Correct-Referrals	38	8	51	0.55	72		AGE GROUP 7-8-9	386	100				
Over-Referrals	15	3	4		28		REFERRED	80	21		φ	/100	
NOT REFERRED	426	89		rt			Correct-Referrals	71	18	99	0.92	89	
Under-Referrals	36	8	49	0.81	68		Over-Referrals	9	3	3		11	
Non-Referrals	390	81	96				NOT REFERRED	306	79		rt		
AGE GROUP 13-14-15	388	100					Under-Referrals	1	b	1	1.00	1	
REFERRED	44	13		φ	/100		Non-Referrals	305	79	97			
Correct-Referrals	37	11	60	0.66	84		AGE GROUP 10-11-12	525	100				
Over-Referrals	7	2	3		16		REFERRED	86	17		φ	/100	
NOT REFERRED	294	87		rt			Correct-Referrals	82	16	100	0.97	95	
Under-Referrals	25	8	40	0.90	56		Over-Referrals	4	1	1		5	
Non-Referrals	269	79	97				NOT REFERRED	439	83		rt		
TELEBINOCULAR							Under-Referrals	-	-	-	1.00	-	
TOTAL	1274	100					Non-Referrals	439	83	99			
REFERRED	180	15		φ	/100								
Correct-Referrals	113	9	56	0.51	63								
Over-Referrals	67	6	7		37								

* Methods used to determine criteria, discussion of statistical methods employed are discussed in Vision Screening for Elementary Schools.⁶

Table 3—1956 Effectiveness of Screening* (continued)

AGE GROUP 13-14-15	340	100			
REFERRED	63	19		ϕ	/100
Correct-Referrals	62	19	95	0.96	98
Over-Referrals	1	b	b		2
NOT REFERRED	277	81		r_t	
Under-Referrals	3	1	5	1.00	5
Non-Referrals	274	80	100		

* Methods used to determine criteria, discussion of statistical methods employed are discussed in Vision Screening for Elementary Schools.⁶

a. Tetrachloric (r_t) correlations not valid because of small number of referrals.

b. Less than 0.5%.

2. A qualified professional examiner should be utilized to provide the MCT⁶ for all children at the first grade and for all new entrants into elementary school.

3. The examiner doing MCT should have a certificate of completion from an accredited school of optometry, or an M.D. degree with one year of specialized training in ophthalmology in an accredited training center, or two years of practical work in ophthalmology.

4. The professional MCT examiner should act as an employee of the agency responsible for the school health program and, even if part time, should not be in private practice anywhere in the region so that the economic interest of the examiner cannot become an issue.

5. Children who have had the MCT once, and who passed, should be tested annually thereafter only with the Snellen test. This will pick up the myopes who constitute nearly all of the group who fail in following years. Teacher observation should be done continuously. The Snellen testing and the reports of teacher observation, where feasible, should be completed prior to the annual visit of the MCT professional examiner. In this way, children failing the Snellen or referred by teacher observation could be screened by the MCT at the same time as the first graders are being examined and before being referred for private professional attention.

6. The Snellen⁶ procedure should be carried out by a qualified individual, less highly trained than the professional MCT examiner, and hired by the school to do the work once each year. Such persons are likely to be available for the short periods of time involved. This would avoid significant costs for teacher training as well as for teacher screening.

7. Those children failing the MCT should be referred for professional vision attention. Criteria are given in Table 1 and suitable referrals and forms have been developed.⁶

8. The parents of those children with known visual problems in grades two and above should receive a reminder of the need for regular professional attention once each year without being screened. It is fair to say that children with vision problems change more and require the most frequent vision attention.

9. The school health education program should include formalized work on visual health. It should also impinge on the parents so that there will be family interest in getting regular professional attention for children with vision problems.

10. The school administrator should receive from the professional examiner an analysis of the cases referred. These should be compared to estimates which have been developed⁶ which provide an administrative check on the effectiveness of the program. Significant departures should be studied carefully.

11. The multiprofessional steering committee should have the obligation of verifying the adequacy of the screening program, the absence of excessive under- and overreferrals, and should modify the referral criteria to meet local professional practices. They should also participate in developing the school visual health education program, without which much of the screening will not result in professional care for the children who are found to be needing it.

Table 4—Analysis of Costs of Screening

Number	1954 1,163	1955 1,475	1956 1,274
1. Teacher observation	Time and cost not calculated		
2. Nurse observation			
3. State recommended procedure			
a. Teacher preparation*	306	95	—
b. Teacher testing	118	81	—
c. Nurse preparation	197	18	15
d. Nurse testing	51	51	184
	—	—	—
Total hours	672	245	199
Cost @ \$3.50	\$2,352.00	\$857.50	\$696.50
Time per pupil	33 Min.	9.5 Min.	9.2 Min.
Cost per pupil	\$ 1.93	\$ 0.55	\$ 0.53
4. Telebinocular			
a. Nurse-technician preparation	—	5	14
b. Volunteer training	—	3	3
c. Nurse-technician testing	—	211	142
	—	—	—
Total hours	—	219	159
Cost @ \$3.50	—	\$766.50	\$556.50
Time per pupil	—	8.5 Min.	7.3 Min.
Cost per pupil	—	\$ 0.49	\$ 0.42
5. Massachusetts Vision Kit			
a. Nurse-technician preparation	4	—	4
b. Volunteer training	3	—	3
c. Nurse-technician testing	108	—	133
	—	—	—
Total hours	115	—	140
Cost @ \$3.50	\$402.50	—	\$490.00
Time per pupil	5.1 Min.	—	6.4 Min.
Cost per pupil	\$ 0.33	—	\$ 0.37
6. Modified Clinical Technique			
a. Volunteer training	2	2	2
b. Professional examiner testing	113	125	94
	—	—	—
Total hours	115	127	96
Cost @ \$6.00	\$690.00	\$762.00	\$576.00
Time per pupil	5.6 Min.	4.9 Min.	4.5 Min.
Cost per pupil	\$ 0.56	\$ 0.49	\$ 0.45

* Including prescribed six-hour training program.

Table 5—Projected Community Costs of Overreferrals—1956

	Assuming \$15.00 per Professional Examination			
	Overreferrals		Underreferrals	
	Number	Cost	Number	Per cent
Teacher observation	218 @	\$15.00 = \$3,270.00	115	52
Nurse observation	4 @	15.00 = 60.00	174	79
State recommended procedure	10 @	15.00 = 150.00	166	75
Massachusetts Vision Kit	33 @	15.00 = 495.00	91	45
Telebinocular	67 @	15.00 = 1,005.00	89	44
Modified Clinical Technique	14 @	15.00 = 210.00	4	2

Summary

1. A three-year longitudinal study of the vision status of approximately 1,000 elementary school children was completed.

2. Many different screening procedures were compared with one another and against clinical examinations. Clinical criteria were established from the study results and these compared favorably with professional opinions as obtained on a nation-wide questionnaire.

3. The Modified Clinical Technique was remarkably efficient, economical, and had the fewest over- or underreferrals.

4. Recommendations are given for conducting satisfactory elementary school vision screening.

5. The role of a health department in promoting research and evaluation in a

disputed field involving several disciplines and interests is discussed.

6. Detailed review of the subject, data, analysis, discussion, criteria, technics, recommendations, and bibliography are available in a book published by the University of California Press entitled, "Vision Screening for Elementary Schools: The Orinda Study."⁶

REFERENCES

1. Simpson, Roy E. Vision Screening of School Children. California State Department of Education, 1953.
2. Crane, M.D., et al. Screening School Children for Visual Defects. Children's Bureau Publication No. 345. Washington, D. C.: U. S. Department of Health, Education, and Welfare, 1954.
3. Kelley, C. R. Visual Screening and Child Development—The North Carolina Study. Raleigh, N. C.: North Carolina State College, 1957.
4. Morgan, A. L., et al. A Survey of Methods Used to Reveal Eye Defects in School Children. Canad. M. J. 67:29-43, 1952.
5. Leverett, H. M. A School Vision Health Study in Danbury, Connecticut. Am. J. Ophth. 39:527-540, 1955.
6. Blum, H. L.; Peters, Henry B.; and Bettman, Jerome W. Vision Screening for Elementary Schools: The Orinda Study. Berkeley, Calif.: University of California Press, 1959.

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Psychotherapy Association to Hold Annual Institute

The American Group Psychotherapy Association will hold its Fourth Annual Institute on January 27 and 28, 1960, at the Henry Hudson Hotel, 353 West 57th Street, New York, N. Y. Major topic of the meeting will be the group therapist—his personality, training, and functions. The 17th Annual Conference of this association will follow on January 29 and 30, 1960, at the same hotel. Program information from American Group Psychotherapy Association, Inc., 1790 Broadway, New York 19.